

REMARKS

Claims 21-22, 47-48, 53 and 54 are pending in the present application.

Claim Amendments

By this amendment, new claims 53-54 are added. Claims 53 and 54 include the limitation of a specific surfactant (page 54, line 1 to page 56, line 8; Table 2; page 95, line 1 to page 97, line 9; Tables 6 and 7). No new matter is added by this amendment.

Double Patenting Rejection

Claims 21-22 and 47-48 are provisionally rejected on the ground of judicially-created obviousness-type double patenting over claims 54, 57, 60, 63, 70, 75, 85 and 92 of co-pending commonly-assigned application No. 10/665,088. This rejection respectfully is traversed to the extent deemed to apply to the claims as amended.

In response, applicants believe that the provisional double patenting rejection is without basis.

The sole remaining claims 21-22 and 47-48 are directed to "ink sets" where a specific surfactant is employed as defined by the

recited expression (1). By contrast, the claims of the co-pending application focus on the identity of the specific ink component employed. As a result, it is asserted that the respective groups of claims are directed to subject matter which is not obvious in view of the other, such that the obviousness-type double patenting rejection is without basis.

The rejection should accordingly be withdrawn.

Rejection of under 35 USC 102(b)

Claims 21, 22, 47 and 48 stand rejected under 35 USC 102(b) as being anticipated by Kato '203. This rejection respectfully is traversed.

Kato '203 is directed to an ink composition which comprises a first colorant, a second colorant, a penetrating agent, water, and a water-soluble organic solvent.

The Kato patent discloses a surface tension of from 25 to 50 mN/m (column 8, lines 45-47) - however, the patent does not teach whether the surface tension is a dynamic surface tension or a static surface tension.

Accordingly, the reference fails to teach or suggest the difference between the dynamic surface tension and static surface tension (as set forth in claims 21 and 22), or the difference

between the two dynamic surface tension values (set forth at claims 47 and 48).

For these reasons, the patent cannot be said to anticipate the claimed invention.

These surface tension limitations impart patentability to the claimed invention for the following reasons.

The difference between dynamic surface tension and static surface tension

The dynamic surface tension and static surface tension are distinct from one another as discussed at page 9, line 17 to page 11, line 2 of the specification.

In an ink jet recording apparatus for recording an image with the ink jet recording method, during the successive discharges of liquid droplets of the ink composition, new surfaces of the ink compositions are generated in succession at the discharge port of the front end of the ink chamber in the ink head. Accordingly, the motion of the ink composition is fast, and there is a large influence by dynamic surface tension.

On the other hand, in the ink chamber, after the discharge of the ink composition, the ink composition is replenished by a capillary force from the ink tank by a volume corresponding to a decrease resulting from the discharge, so that the motion of the ink composition is slow, and the surface tension can be regarded as

being in a static state. There is thus no influence by the static surface tension.

Thus, since both the dynamic surface tension and the static surface tension of the ink composition exert influences at the discharge, it is necessary to consider a balance of the dynamic surface tension and the static surface tension in order to achieve stable discharge of the liquid droplets of the ink composition.

Also, the ink composition, upon image recording by deposition of the liquid droplet onto the recording material, shows fast motion at the moment of landing of the liquid droplet onto the recording material when the recording material is an absorbent material.

In this manner, the surface tension of the ink composition changes from a dynamic surface tension to a static surface tension, and therefore, a large difference between the dynamic surface tension and the static surface tension requires a long time for drying of the ink composition on the recording material - thereby generating a blotting. Also, penetration at the rear is caused by an excessive permeation.

Thus, in the ink jet recording method, the relationship between the dynamic surface tension at a higher frequency and a static surface tension of the ink composition is important.

The difference between dynamic surface tensions

The definition of the difference between a dynamic surface tension at a higher frequency and a dynamic surface tension at a lower frequency is described at page 27, line 10 to page 29, line 2 of the specification.

In an ink jet recording apparatus for recording an image with the ink jet recording method, at the successive discharges of liquid droplets of the ink composition, new surfaces of the ink compositions are generated in succession at the discharge port at the front end of the ink chamber in the ink head. Accordingly, the motion of the ink composition is fast, and there is a large influence of a dynamic surface tension at a higher frequency of about 100Hz, corresponding to the dynamic surface tension in a state of fast motion.

On the other hand, in the ink chamber, after the discharge of the ink composition, the ink composition is replenished by a capillary force from the ink tank by a volume corresponding to a decrease resulting from the discharge, so that the motion of the ink composition is slow and there is a large influence of a dynamic surface tension at a lower frequency of about 1 Hz, corresponding to the dynamic tension in a state of slow motion.

Thus, since both the dynamic surface tension at the higher frequency and the dynamic surface tension at the lower frequency

exert influences at the discharge, it is necessary to consider a balance of the dynamic surface tension of the lower frequency in order to achieve stable discharge of the liquid droplets of the ink composition.

Also, the ink composition, at the image recording by deposition of the liquid droplets onto the recording material, shows fast motion at the moment of landing of the liquid droplet onto the recording material, but becomes gradually slower thereafter, and the ink composition penetrates slowly into the recording material when the recording material is an absorbent material. In this manner, the surface tension of the ink composition changes from a dynamic surface tension in a state of fast motion to a dynamic surface tension in a state of slow motion, and, in the case where the dynamic surface tension at the higher frequency, and the dynamic surface tension at the lower frequency have a large difference, the ink composition requires a long time for drying on the recording material - thereby generating a blotting. Also, penetration at the rear is caused by an excessive permeation.

Thus, in the ink jet recording method, the relationship between the dynamic surface tension at high frequency and the dynamic surface tension at low frequency concerning the ink composition is important.

The ink set of the present invention

With respect to the ink set of the present invention and its advantageous effects, the Examiner's attention is directed to page 20, line 24 to page 21, line 12; page 22, lines 1-18; page 36, line 22 to page 37, line 8; and page 37, line 21 to page 38, line 16.

The ink set described at claims 21, 22, 47 and 48 includes an ink composition capable of realizing a recorded image excellent in cyan color formation, an ink composition capable of realizing a recorded image excellent in magenta color formation, and an ink composition capable of realizing a recorded image excellent in yellow color formation.

Thus, a recorded image of black color of a high density can be realized by superposing the above three ink compositions as described in claims 21 and 47, or employing the four kinds of ink compositions, namely, an ink composition capable of realizing a recorded image excellent in black color formation as described in claims 22 and 48, together with the above three kinds of ink compositions. Accordingly, a full-color recorded image with an excellent color formation can be provided.

In view of the above, the claimed invention is neither anticipated by nor obvious in view of the cited reference. The rejection is thus without basis and should be withdrawn.

New Claims 53 and 54

New claims 53 and 54 are added directed to preferred embodiments. The embodiments of claims 53 and 54 are neither disclosed nor suggested by the cited prior art. For example, the new claims do not include the glycol surfactants of the Kato reference. These claims should accordingly be found to be directed to allowable subject matter.

The application is now in condition for allowance and an early indication of same earnestly is solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact James W. Hellwege (Reg. No. 28,808) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

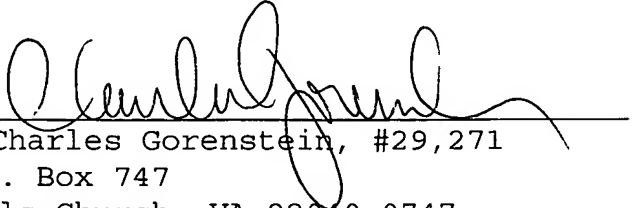
If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Appl. No. 10/713,226

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By


A handwritten signature in black ink, appearing to read "Charles Gorenstein", is written over a horizontal line.

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